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Agenda

- Health Hero Network Background
- Current Technology Solutions
- Contribution to MedKnowledgeMent
  - Information and Knowledge Acquisition → The Feedback Loops
  - Contribution to Innovations
  - Linkage to Other Parts of Project
  - Patient Trials and Expected Outcomes

Health Hero Network Vision

- A better model of care is possible
- Crisis care → Coordinated care
- eHealth Networks and Technologies = A Powerful Enabler

Health Hero Network

- Founded 1988 in Mountain View, California. Health Hero Network Ltd established 2003 in Dublin, Ireland.
- 25 employees, $5 million annual sales, serving 30 provider sites and 2500 patients with daily in-home monitoring.
- Solution Partners signed in Ireland, France, Netherlands. Expecting to add Spain, Belgium, Norway in 2003.
- Licensees include Veterans Health Affairs, Mercy Health System, American Medical Alert, TheraSense, Philips.

eHealth Demonstration:

Veterans Health Affairs (US)

- Chronic care program using model of care based on eHealth Networks and Technologies from Health Hero Network
- 791 elderly high-risk patients with hypertension, heart failure, COPD, diabetes, enrolled for 1 year, compared to comparison group data
- Results (Disease Management, Volume 5, Number 2, 2002)
  - 63% reduction in hospital admissions
  - 60% reduction in hospital bed days
  - 40% reduction in emergency room visits
  - 64% reduction in nursing home admissions
  - 88% reduction in nursing home bed days
  - Significant improvement in Quality of Life

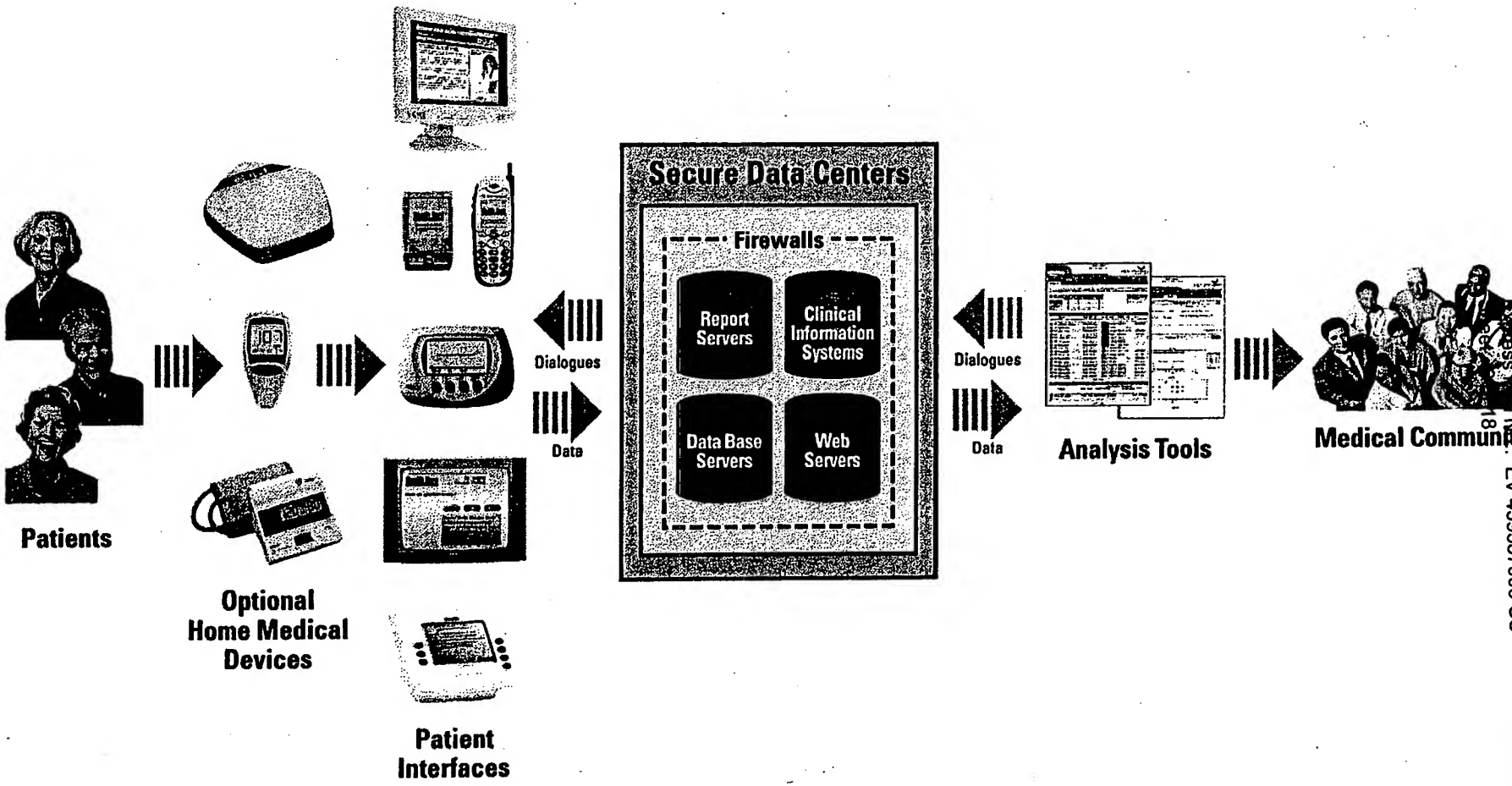
eHealth Demonstration:

Mercy Health System (US)

- Diabetes management program using eHealth Networks and Technologies from Health Hero Network
- 169 low income diabetes patients, one year study period using comparative cohort data from previous calendar year
- Results (Diabetes Technology & Therapeutics Journal, Dec 2002)
  - Outpatient visits reduced 49% ($p < 0.001$)
  - Inpatient admissions reduced 32% ($p < 0.07$)
  - ER encounters reduced 34% ($p < 0.06$)
  - Significant increase in quality of life scores
  - Medication compliance increased from 34% to 94%

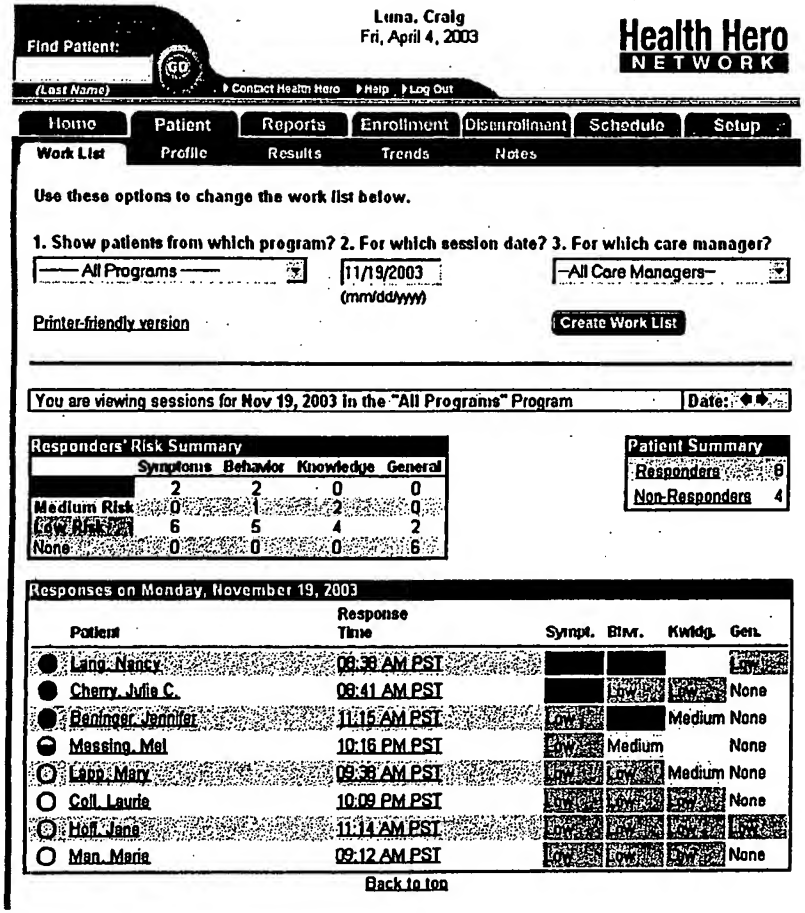
Health Hero Network Platform

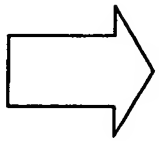
Vision: Open System for Chronic Care Research and Innovation, Any Device, Any Disease, Many Partners

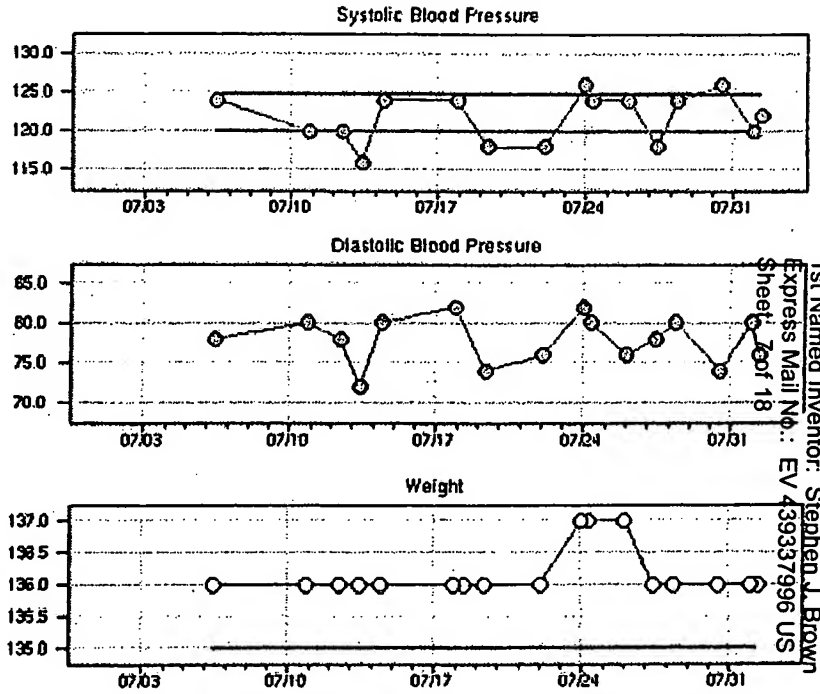


Decision Support Tools for Caregivers

Vision: Intelligent, Simple, Web-based, Integrated with Existing Clinical Information Systems and Care Processes

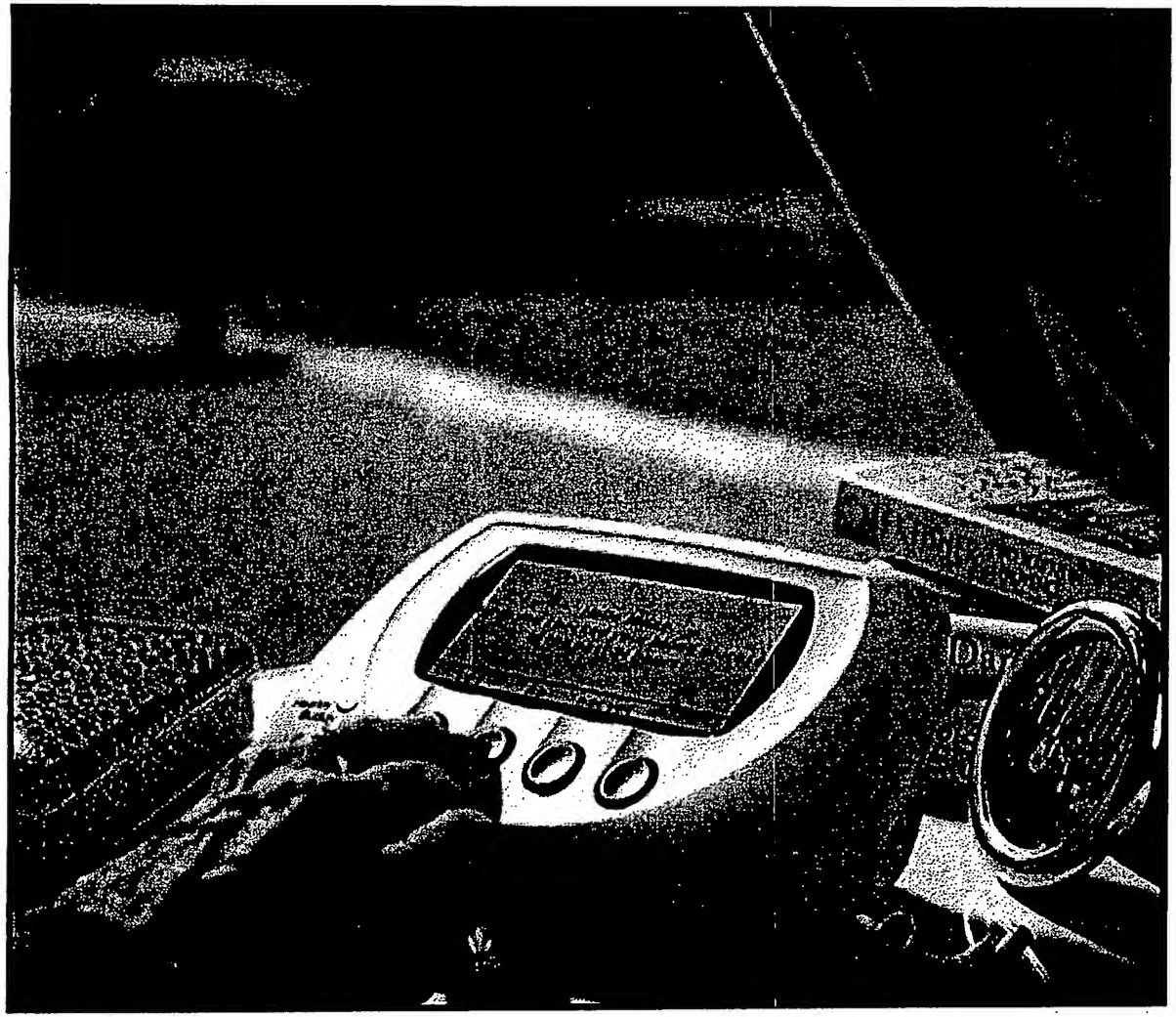


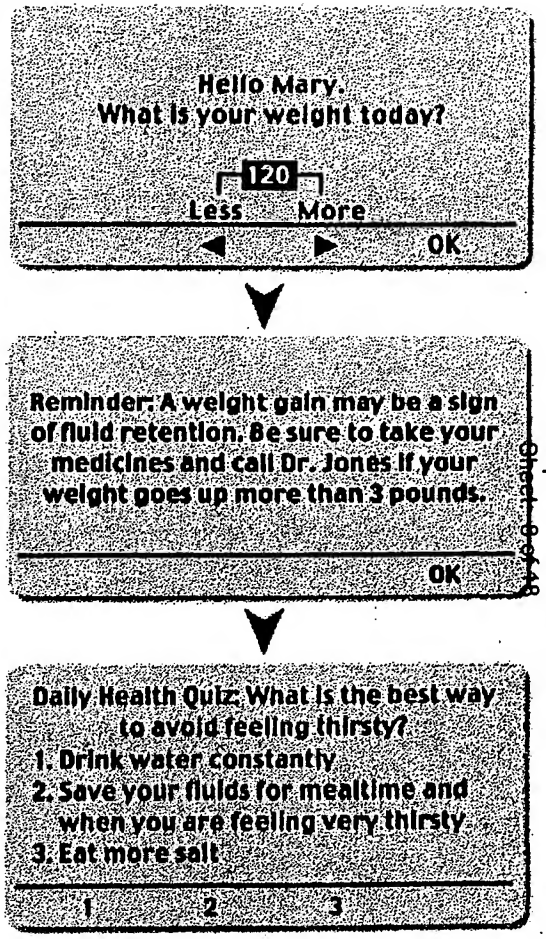




Daily Dialogue with the Patient

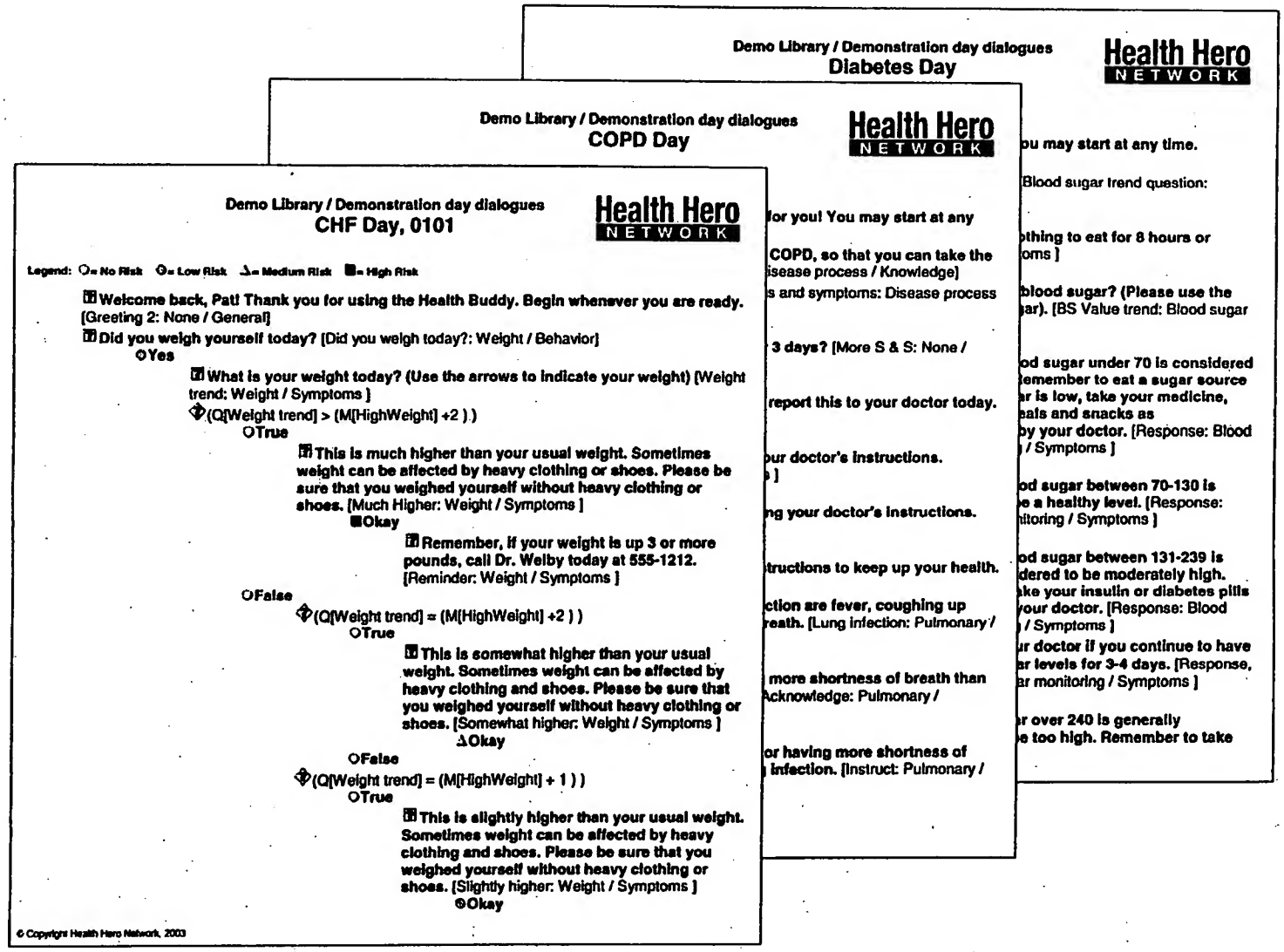
Vision: Intelligent, Interactive, Personalized, Simple, Integrated with Consumer and Medical Devices





Patient Dialogue Content

Vision: Based on Latest Medical Knowledge, Individualized, Generating Real-time Information



Demo Library / Demonstration day dialogues
CHF Day, 0101

Health Hero NETWORK

Legend: ○= No Risk ◎= Low Risk △= Medium Risk ■= High Risk

Welcome back, Pat! Thank you for using the Health Buddy. Begin whenever you are ready. [Greeting 2: None / General]

Did you weigh yourself today? [Did you weigh today?: Weight / Behavior]

◎Yes

What is your weight today? (Use the arrows to indicate your weight) [Weight trend: Weight / Symptoms]

◈(Q[Weight trend] > (M[HighWeight] +2))

○True

This is much higher than your usual weight. Sometimes weight can be affected by heavy clothing or shoes. Please be sure that you weighed yourself without heavy clothing or shoes. [Much Higher: Weight / Symptoms]

■Okay

Remember, if your weight is up 3 or more pounds, call Dr. Welby today at 555-1212. [Reminder: Weight / Symptoms]

○False

◈(Q[Weight trend] = (M[HighWeight] +2))

○True

This is somewhat higher than your usual weight. Sometimes weight can be affected by heavy clothing and shoes. Please be sure that you weighed yourself without heavy clothing or shoes. [Somewhat higher: Weight / Symptoms]

△Okay

○False

◈(Q[Weight trend] = (M[HighWeight] + 1))

○True

This is slightly higher than your usual weight. Sometimes weight can be affected by heavy clothing and shoes. Please be sure that you weighed yourself without heavy clothing or shoes. [Slightly higher: Weight / Symptoms]

◎Okay

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Demo Library / Demonstration day dialogues
COPD Day

Health Hero NETWORK

for you! You may start at any

COPD, so that you can take the
isease process / Knowledge]

s and symptoms: Disease process

3 days? [More S & S: None /

report this to your doctor today.

our doctor's instructions.
]

ng your doctor's instructions.

tructions to keep up your health.

ction are fever, coughing up
reath. [Lung infection: Pulmonary /

more shortness of breath than
Acknowledge: Pulmonary /

or having more shortness of
infection. [Instruct: Pulmonary /

Demo Library / Demonstration day dialogues
Diabetes Day

Health Hero NETWORK

ou may start at any time.

Blood sugar trend question:

thing to eat for 8 hours or
oms]

blood sugar? (Please use the
ar). [BS Value trend: Blood sugar

od sugar under 70 is considered
emember to eat a sugar source
r is low, take your medicine,
als and snacks as
by your doctor. [Response: Blood
/ Symptoms]

od sugar between 70-130 is
e a healthy level. [Response:
itoring / Symptoms]

od sugar between 131-239 is
dered to be moderately high.
ke your insulin or diabetes pills
your doctor. [Response: Blood
/ Symptoms]

r doctor if you continue to have
r levels for 3-4 days. [Response,
r monitoring / Symptoms]

r over 240 is generally
e too high. Remember to take

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1st Named Inventor: Stephen J. Brown
Express Mail No.: EV 439337996 US Docket No.: 6858P056
Sheet: 9 of 18

Health Hero Network Contribution to MedKnowledgeMent

- 1.1 Information and Knowledge Sources and Formats
- 1.2 Information Acquisition → Information Base
- 1.3 Knowledge Acquisition → Knowledge Base
- 1.4 Information and Knowledge Processing → DSTs to identify gaps between Information Base and Knowledge Base (i.e. gaps between what is and what should be)
- 1.5 Information and Knowledge Rendering → Rendering Engine is the interface to end users
- 1.6 Information and Knowledge Acquisition → The Feedback Loops

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Sheet: 10 of 18

Project Overview

Institutions

RTD Activities

End Users

Knowledge Sources
- Medical Literature
- Medical Schools
- Medical Experts
- Medical Associations
- Guidelines
- Human Genome
- Public Health
- Industry

Information Sources
- Hospitals (EHR)
- Primary care
- Labs
- Insurance claims
- Home care
- Disease management

Knowledge Base

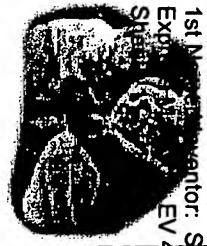
Information Base

Decision Support Tools

Rendering Engine

Feedback Engine
- Dialogue engine
- Care management engine
- Research engine

Caregivers



Citizen

Researchers
Life Sciences Link

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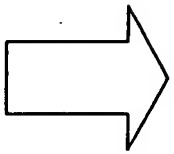
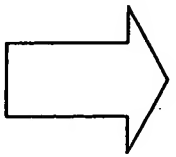
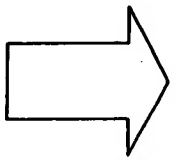
Information and Knowledge Acquisition → The Feedback Loops

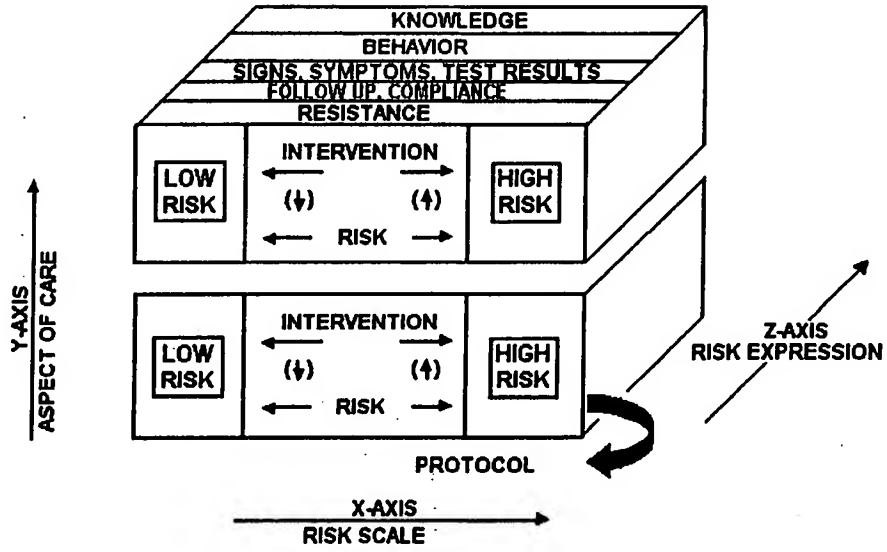
- Patient Dialogue Engine: Individualized Communication
  - → Generated using Information and Knowledge Base
  - → Interface with Rendering Engine
  - → Feedback to Information Base
- Care Management Engine: Just-in-time Care
  - → Generated using Information and Knowledge Base
  - → Feedback to DSTs
- Research Engine: Real-time Research
  - → Interface to Information Base [extract existing data]
  - → Interface to Dialogue Engine [when new data is required]
  - → Feedback to Knowledge Base [new discoveries]

Health Hero Network Contribution to Innovations

Current Status	New Innovations
Patient Dialogue Engine • Pre-packaged, mass customized programs • Content libraries • Health Buddy	 • Automated individualization • Content generated by knowledge base rules applied to information base • Interface to Rendering Engine for any device
Care Management Engine • Risk stratification • Organizational workflow and efficiency tools • Manual feedback process	 • Intelligent risk tuning and link to DSTs • Organizational optimization • Automated feedback loop
Research Engine • Data Export to SAS	 • Identify subgroups and correlations • Test hypotheses on living database

Integrating Feedback Loops Within MedKnowledgeMent

- Application Program Interfaces
- Standards for Data Classification
- Ontology for Information and Knowledge Used in Feedback Process



A 3-DIMENSIONAL MODEL OF DISEASE

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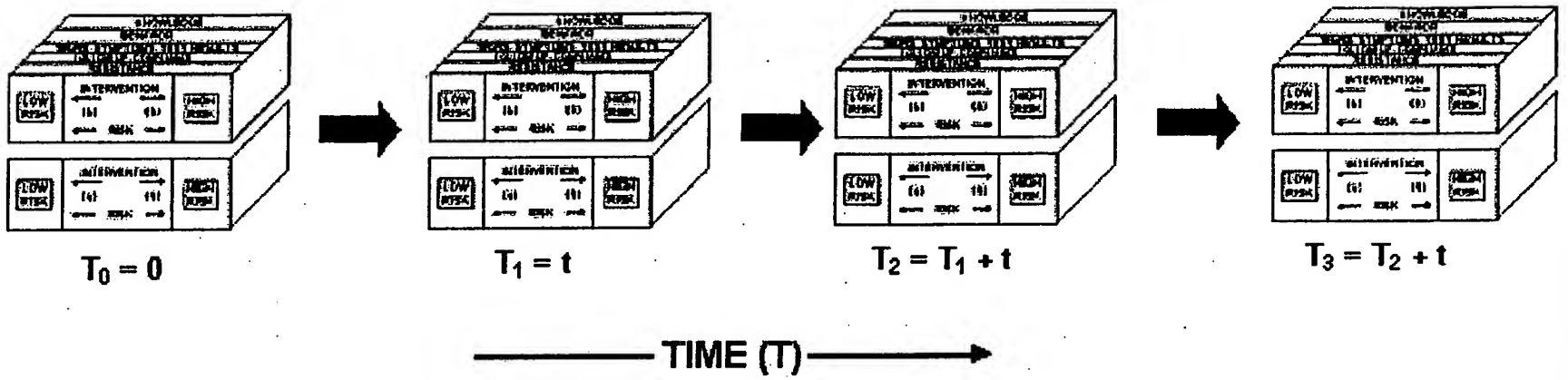
Feedback Process

Overall goal is apply and generate medical knowledge in a continuous process that leads to lowest achievable risk resulting in:

- → Higher quality of life
- → Improved clinical outcomes
- → Lower cost of care



Patient Trials

- Application to Major Diseases with Great Cost to Society
- Multi-center Demonstration Project
  - Health care and research centers in Europe
  - Large enough for meaningful result
  - Small enough to fit budget
- Standardized Protocol for Data Collection
- Outcomes Analysis
  - Aggregate data analysis for global impact
  - Site specific data analysis by country, disease, and care model
  - Key measures include: acceptability, satisfaction, utilization, clinical impact, medication compliance, quality of life, cost of care
- Medical Review Board
  - Review and approve all site specific study designs

Expected Results

- Reduced emergency department encounters and hospitalizations by detecting patient problems before they become a crisis.
- Improved patient compliance by educating, motivating and monitoring health status and by providing personalized and relevant information.
- Improved safety and quality of care by providing timely and actionable information to healthcare professionals through quality assured processes that can be continuously improved.
- Continuity of care, particularly for the elderly, through integrated, interconnected monitoring and information systems, rather than fragmented, episodic, and crisis driven care.

Expected benefit to the EU

Health is a key IST application for all citizens

- Stimulation of investment in information society technologies to modernize healthcare and enable sustained quality and access.
- Creation of an open platform for the application and generation of Medical Knowledge is an opportunity for European leadership at the convergence of information technologies, medical and consumer devices, and networks.
- Clinical applications that can be deployed as new service offerings over existing and new network infrastructures including broadband and wireless networks will stimulate the growth and success of those networks.
- The emerging eHealth sector will become vital to every region in the world that will experience the demands of an aging population and the resulting need for advanced and sustainable models of care.